Example of A Mitigation TAP

Zhu, Xianli

Publication date:
2013

Document Version
Publisher's PDF, also known as Version of record

Example of A Mitigation TAP

Xianli Zhu
UNEP Risoe Centre

21-24 Feb 2012, Bangkok

UNEP

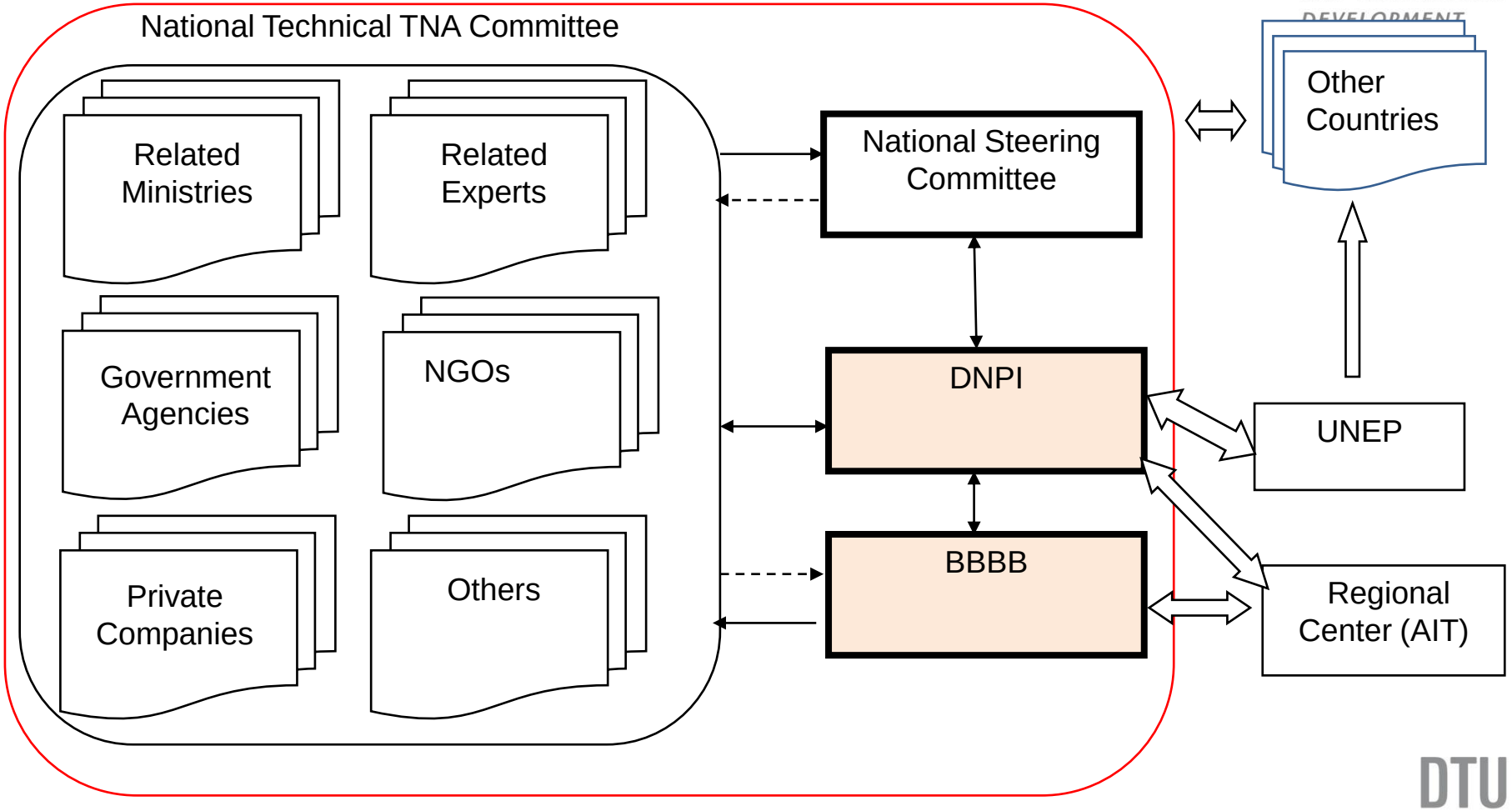
UNEP RISØ CENTRE
ENERGY, CLIMATE AND SUSTAINABLE DEVELOPMENT

Background:

- Based on the report from one of the first-round TNA countries
- Just for example purposes, the report is still under revision

DTU

National TNA institutional setup



Stakeholder participation

Stakeholder engagement processes:

- Inviting various stakeholders in discussion forum.
- Conducting focus group discussions (FGDs), workshops and meetings with related sectors.
- Involving reviewers to check the content of the TNA study.
- Inter- sectoral meetings for cross cutting issues and consultation meeting with the related national policy makers

Process and Results of Sector Selection

- Process: The first meeting of the stakeholders and experts in the beginning of the project has concluded that there were three sectors for TNA Mitigation namely forestry including peat, waste and energy.
- Results: forestry including peat, waste and energy are selected as key sectors for mitigation

Results of Technology Selection

Sector	Technology Prioritised
Energy sector	Regenerative Burner Combustion System (RBCS)
	PV cell development and industrialization
Waste sector	Mechanical Biological Treatment (MBT)
	In-Vessel Composting (IVC)
	Low Solid Anaerobic Digestion (LSAD)
Forest and Peat sector	Carbon Measurement and Monitoring
	Peat Re-Mapping
	Water Management

Sector background

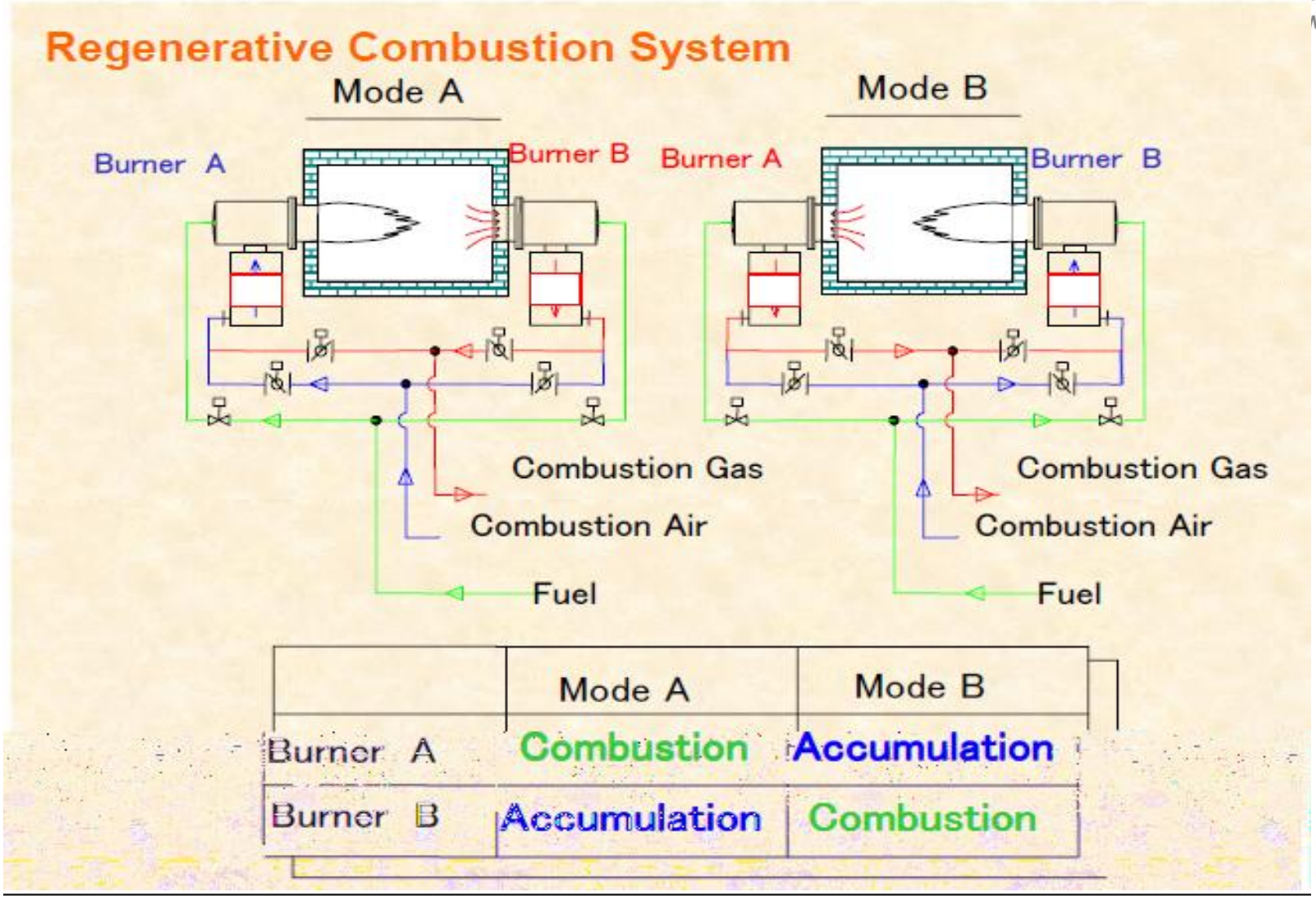
- The national government is conducting a program reduction of GHG emissions by 20% in 2020 in its own abilities and can be increased to 40% if they received aid from donor countries.
- The steel industry is energy-intensive industries and still uses low-efficient conventional technologies. The energy efficiency of steel making can be saved by 30% through retrofitting with RBCS.
- This can also improve the quality and competitiveness of national steel production
- Currently, the country relies on import to meet 1/3 of its national demand for steel. RBCS can in the long run help reduce national dependence on imported steel
- RBCS can also be applied in other ceramics and other energy-intensive industries

Regenerative Burner Combustion System (RBCS)

About the technology:

- RBCS technology is a waste heat recovery technology that can be used in various industries that use the furnace in the production process. It recovers waste heat of the furnace exhaust gas to heat-up combustion air at the furnace site by installing heat recovery regenerator.
- The key component of RBCS is a pair of burners, each with a regenerator.
- During combustion, one side of burner combust fuel where another side of burner accumulate heat of exhaust gas into heat recovering regenerator.
- Then combusting burner switch and burner accumulated heat of exhaust gas combust fuel high temperature combustion air which takes heat out of heat recovering regenerator, where the other side of burner accumulate heat of exhaust gas into another heat recovering regenerator, securing stable combustion and high-efficient combustion as well as low NOx emissions.

Regenerative Combustion System



Benefits of Regenerative Burning

Depending on the furnace type and fuel conditions, Regenerative Burner Combust System can help achieve:

- Energy saving: 20 to 50% of energy use reduction
- Pilot application in steel plant: the fuel gas consumption can be reduced by 35% and steel production increased by 15%, the production was disrupted for 5 months due to the retrofiting for installation of RBCS,the repayment period of the investment and revenue losses during commissioning only about 13 months
- Environment: max. 50% of NOx reduction is possible with high temperature combustion.
- Reduce maintenance costs and cracks in products
- Identified as an important and promising retrofit technology in steel, ceramics and other energy-intensive industry for energy saving

Application status and potential

- Global status: RBCS technology developed since the early 1990s in several countries, including in Japan. Today, more than 540 furnaces have used RBCs in Japan and first commercial facility constructed in 1996. The technology is already mature and has been used in several countries.
- A pilot RBCS-based steel plant was built and put into operation in 2006 through a joint project between the national government and Japan
- The country consumed 11 mt steel in 2010, 8 mt from national production. Its steel production is expected to further increase
- The technology can also be used in other furnace-based industries, e.g. ceramics industry, automobile, non-ferrous metals, and other sectors

Steps of Barrier Analysis and Enabling Framework for each selected technology

Step 1: Identify all possible barriers

- Identify barriers from existing information or documents such as from TNA 2009 document (institutional, social, technical and financial barriers).
- For each prioritized technology remap these barriers into six barrier categories of TTD suggested by UNEP: regulatory, financial, institutional, social, capacity and IPR.

Step 2: Screen for non-relevance

- Identify key barriers for each prioritized technology based on its importance with relevance to chains of TTD 'innovation systems' process.

Step 3: Establish hierarchy of barriers

- For each prioritized technology, decompose barriers or arrange in a hierarchical framework for each of six aspects of barriers.

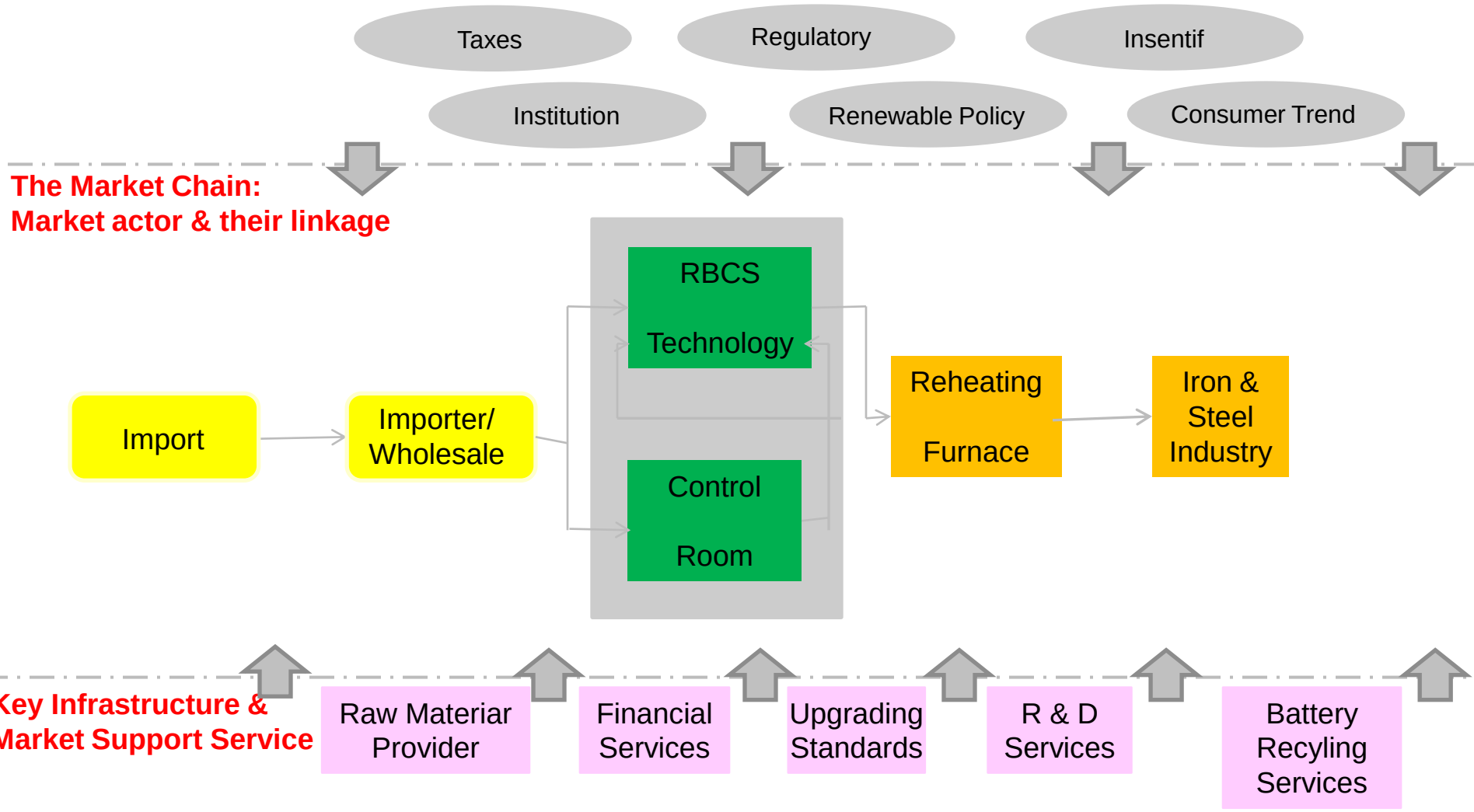
Step 4: Analyze causal relation

- Analyze the results of decomposing barriers in logical framework relationships of all six barrier aspects based on the process of "innovation system", from R&D chain up to diffusion chain.

Step 5: Find initial solutions

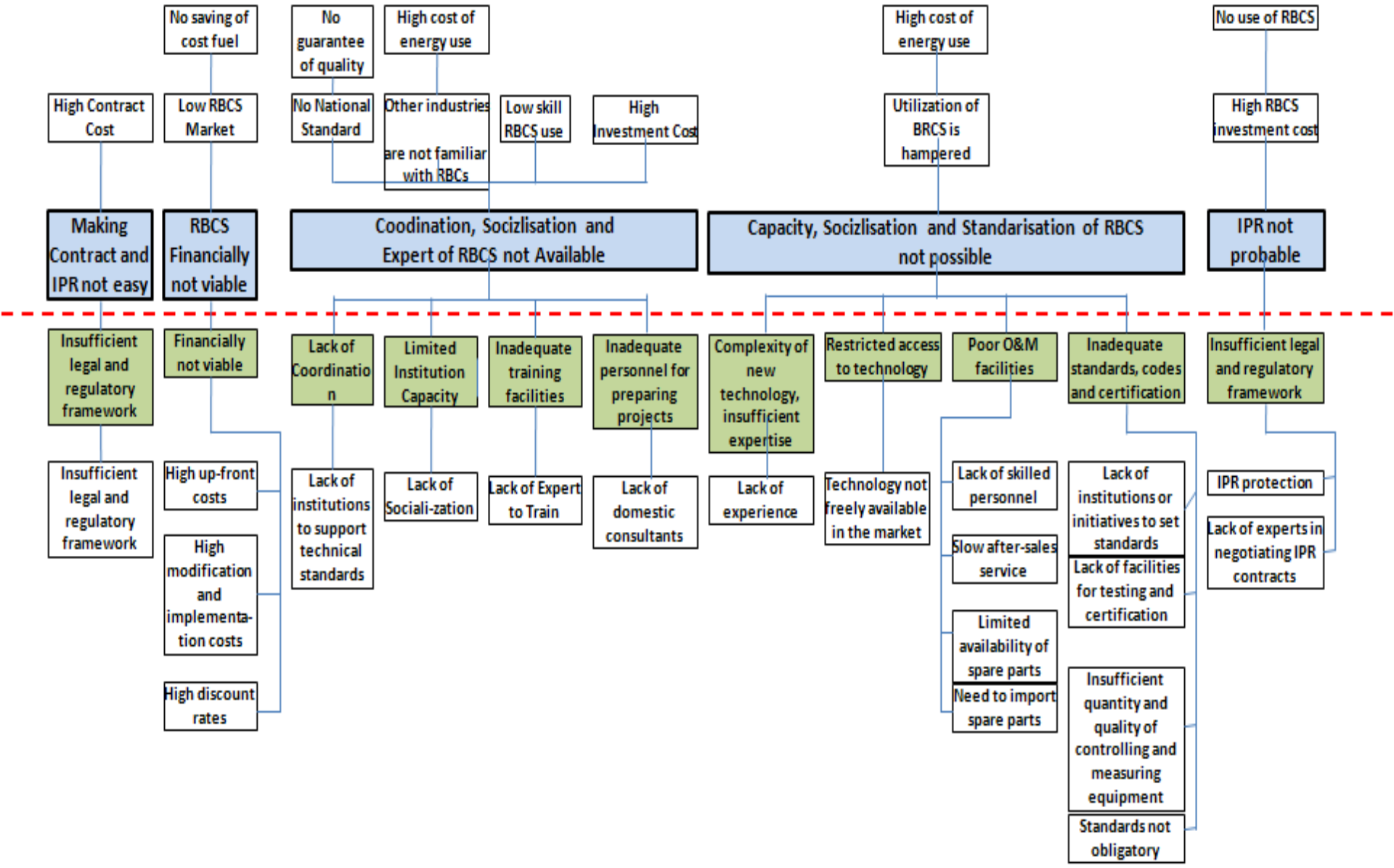
Market Map for RBCS

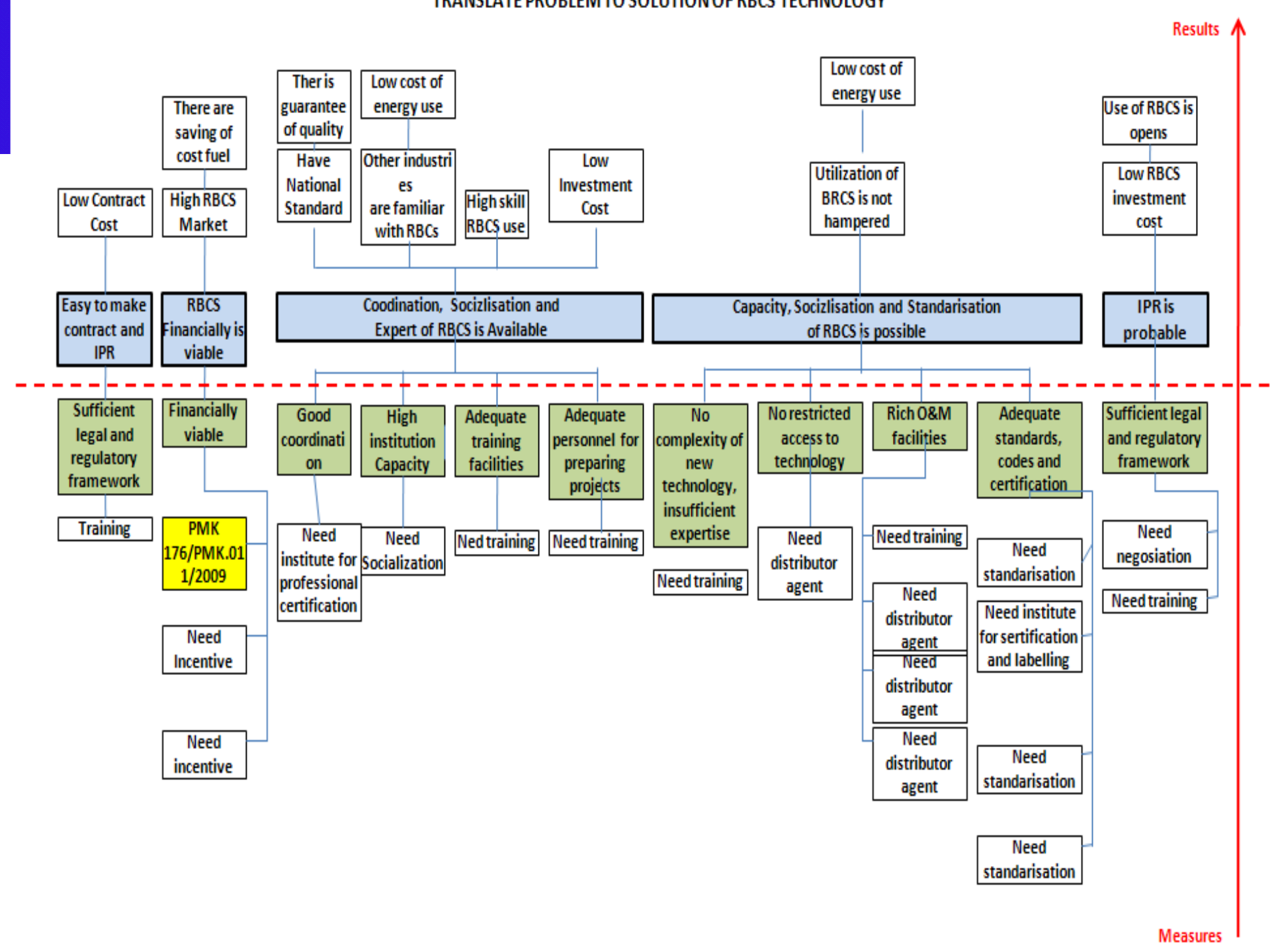
The Market Environment: Institutions, Rules, Norms, Trends



CAUSAL RELATION OF RBCS TECHNOLOGY

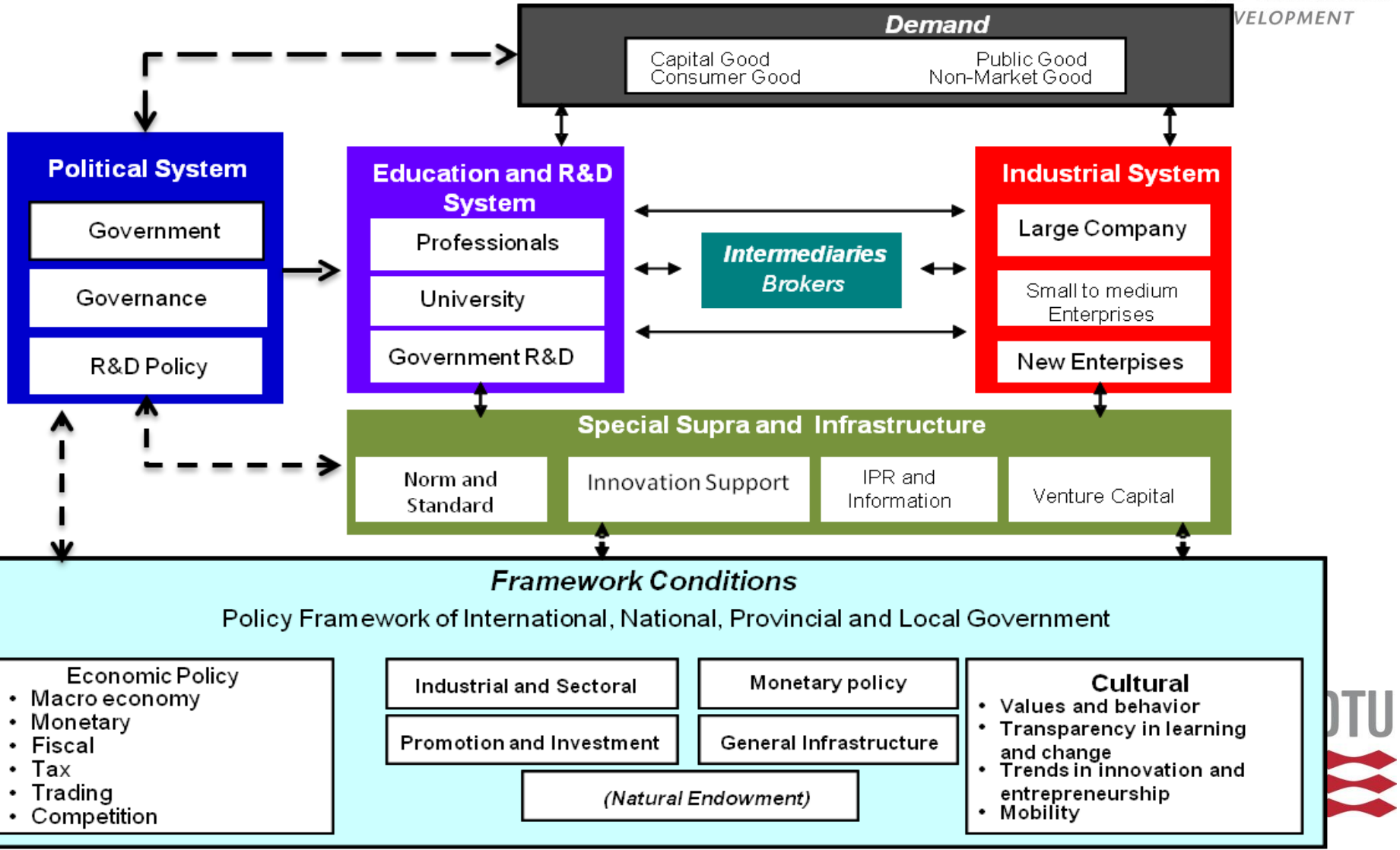
Starter problem
Cause/effect




TRANSLATE PROBLEM TO SOLUTION OF RBCS TECHNOLOGY
Results
Measures
There are saving of cost fuel
Ther is guarantee of quality
Low cost of energy use
Low cost of energy use
Use of RBCS is opens
Low Contract Cost
High RBCS Market
Have National Standard
Other industri es are familiar with RBCs
High skill RBCS use
Low Investment Cost
Utilization of BRCS is not hampered
Low RBCS investment cost
Easy to make contract and IPR
RBCS Financially is viable
Coodination, Socizlisation and Expert of RBCS is Available
Capacity, Socizlisation and Standarisation of RBCS is possible
IPR is probable
Sufficient legal and regulatory framework
Financially viable
Good coordinati on
High institution Capacity
Adequate training facilities
Adequate personnel for preparing projects
No complexity of new technology, insufficient expertise
No restricted access to technology
Rich O&M facilities
Adequate standards, codes and certification
Sufficient legal and regulatory framework
Training
PMK 176/PMK.01 1/2009
Need institute for professional certification
Need Socialization
Ned training
Need training
Need training
Need distributor agent
Need training
Need standarisation
Need negosiation
Need Incentive
Need distributor agent
Need institute for sertification and labelling
Need training
Need incentive
Need distributor agent
Need standarisation
Need standarisation

The framework of National Innovation System

UNEP RISØ CENTRE
ENERGY, CLIMATE AND SUSTAINABLE DEVELOPMENT



Barrier and Enabling Framework

Category	Barrier	Sub Barrier	Policy Incentives
Policies	Insufficient legal and regulatory framework	Absence of laws and bylaws on climate technologies (contract law, IPR protection)	Related agencies: training
Financing	Financially not viable	High up-front costs	
		High modification and implementation costs	Ministry of Finance: incentive rate
		High discount rates	Ministry of Finance: incentive rate
Institutional	Lack of coordination	Lack of institutions to support technical standards	Related institutions: Institute for Professional Certification
	Limited institutional capacity	Lack of socialization	Promotion by Ministry of Industry and National Association for Steel Industry
	Inadequate training facilities	Lack of experts to train	Related agencies: training
	Inadequate personnel for preparing projects	Lack of domestic consultants (to reduce transaction costs)	Related agencies: training of consultant
IPR	Insufficient legal and regulatory framework	Absence of laws and bylaws on climate technologies (IPR protection)	Ministrty of Industry: negosiation
		Lack of experts in negotiating IPR contracts	Ministrty of Industry: training

Barrier and Enabling Framework

Category	Barrier	Sub Barrier	Policy Incentives Lacking
Capacity	Complexity of new technology, insufficient expertise	Lack of experience	Related agencies: training
	Restricted access to technology	Technology not freely available in the market	Ministry of Industry: Distributor
	Poor O&M facilities	Lack of skilled personnel	Related agencies: training
		Slow after-sales service	
		Limited availability of spare parts (few suppliers, long supply routes)	Ministry of Industry: Distributor
		Need to import spare parts	Ministry of Industry: Distributor
	Inadequate standards, codes and certification	Lack of institutions or initiatives to set standards	Ministry of Industry and BSN: RBCS standardization
		Lack of facilities for testing and certification	Ministry of Industry: Institute for profesional certicifation
		Insufficient quantity and quality of controlling and measuring equipment	Ministry of Industry and BSN: RBCS standardization
		Standards not obligatory	Ministry of Industry and BSN: RBCS standardization

Existing policy: Import duty on of machinery, and goods and materials for development or extension of industries in the framework of investment enhancement is 0%, as stipulated in the Minister of Finance regulation No. 176/PMK.11/2009.

Recommended Solutions for RBCS Technology

- There should be Minister of Finance Regulation on incentive of interest rate and discount rate for capital goods.
- There should be an institution that does certification for professionals in this area.
- Promote the diffusion of the RBCS in the steel industry, which could be done by Ministry of Industry and the National Association of Steel Industry.
- Training for the operators and consultants for improving negotiation ability.
- There is a need of capable distributors for having spare parts from abroad.
- There is a need for national standards on RBCS that could be issued by Ministry of Industry and National Standardization Body.
- There is a need to improve the testing facilities that could be done by Ministry of Industry.
- There is a need to improve a capacity of negotiation for solving the IPR barrier.

Plans for domestic actions and measures to promote RBCS

- The purpose is to accelerate the process of dissemination of this technology to steel industries in the country. The other industries that use furnaces in the production process, such as ceramics industries are also the target of the next application of this RBCS technology
- More efforts are planned to speed up the diffusion of this technology in other steel making plants, so that the energy conservation of the steel industries in the country will be boosted.
- Promoting RBCS implementation in the steel industry, this can be led by the Ministry of Industry and the national iron and steel industry association.
- During installation and commissioning of the RBCS, the involvement of several research institutions is required in order to maximize technology transfer activities of RBCS.

Plans for domestic actions and measures- Installation of RBCS in the selected steel industry

- RBCS has been applied in one of the country's steel plants;
- A national institution BBB in 2011 has done test and analysis of small-scale (prototype) of RBCS technology. The design and engineering work of RBCS technology was carried out by BBB engineers.
- To enhance human resources capabilities of BBB in the design of RBCS and its control room, it would require the technology transfer from technology owners that are usually from abroad. It is expected that through this technology transfer to BBB engineers, the implementation of RBCS for steel, ceramics, and other energy-intensive industries will be accelerated.

Project ideas for international support

1. Installation of RBCS in the selected steel industries.

- Transfer technology needed is installation of RBCS in selected steel industries.
- Capacity building required is improvement of human resources capabilities in the construction, operation, and maintenance of RBCS.
- Estimated costs: 6.5 m USD, of which 2.5 m USD of losses due to production interruption and 4 m USD of equipment purchase and installation
- Financing aid preferred is grant from donor countries.
- Timeline is short-term to mid-term (1-5 years)
- Indicators of success are the installation of RBCS at a selected steel industry.
- Domestic partner is Ministry of Industry and the national steel industrial association.

Project idea – Training Design and Control Room of RBCS

1. Introduction/Background

- The country's leading technology institution BBB has been trying to create a prototype technology RBCS since June 2011. The national engineers are trying to understand the performance of these technologies, especially the design and operation of the control room for max. fuel consumption reduction.

2. Purpose and Objectives

- The purpose of this activity is the training about designing and operating of the control room for RBCS. Expected to increase the ability of national researchers / engineers, so that RBCS equipment manufacturing and installation can be designed by national engineers, so as to reduce cost and speed up the diffusion of RBCS.

3. Time lines

- 1-5 years.

Project idea – Training Design and Control Room of RBCS

UNEP RISØ CENTRE
ENERGY, CLIMATE AND SUSTAINABLE DEVELOPMENT

4. Indicators of success:

- Improved local capacity in RBCS implementation and Control Room design.

5. Budget/Resource requirements

- The cost of training and control room design RBCS is estimated to be 3 million USD, and this is fully expected from donor countries. The location of the training depends on the discussion with donors.

6. Responsibilities and coordination

- Training of control room design and room RBCs may be accomplished in cooperation with the Center for Conversion and Conservation Technology, Agency for the Assessment and Application of Technology

DTU

UNEP

UNEP RISØ CENTRE

ENERGY, CLIMATE AND SUSTAINABLE DEVELOPMENT

Thanks for your attention !

Xianli Zhu (xzhu@dtu.dk)

www.tech-action.org

www.uneprisoe.org

DTU